FAA Pavement Grooving Requirements

Pavement Groove Measurement Methods

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Presentation Outline

- FAA Rationale for Groove Requirements
- Previous FAA Pavement Grooving Standards
- Current FAA Pavement Grooving Standards
- Groove Measuring Methods
- Comparison of Manual versus Automated Groove Measurements
- Summary
- Acknowledgements

FAA Airport Pavement Grooving Requirements

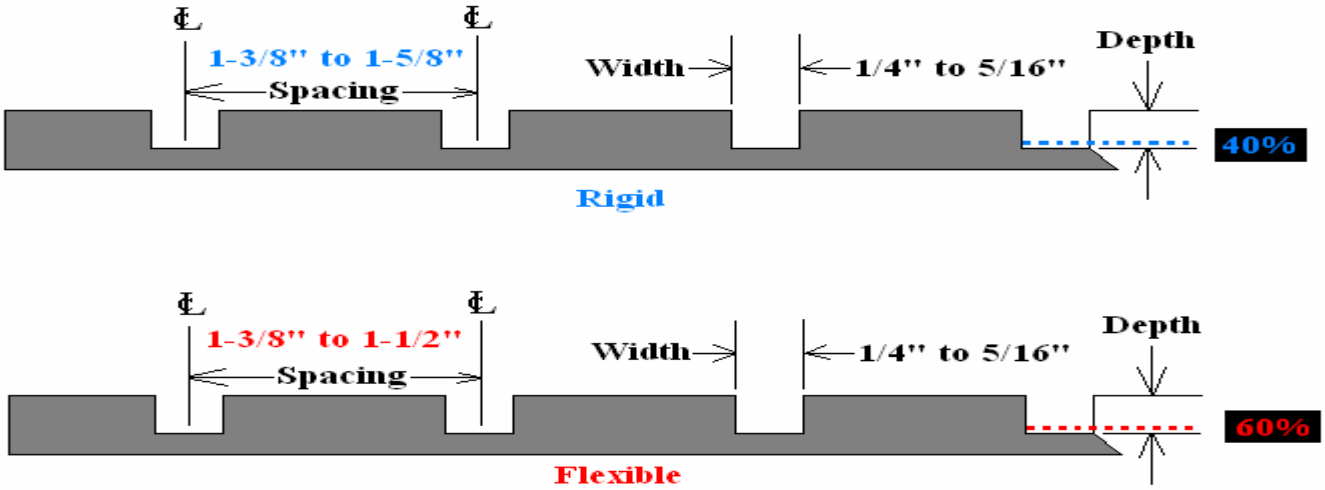
- **Paragraph 2-15 of FAA AC 150/5320-12C states: "Cutting or forming grooves in existing or new pavement is a proven and effective technique for providing skid-resistance and prevention of hydroplaning during wet weather."**
- **"Grooving of all runways,.. serving ..turbojet aircraft, is considered high priority safety work and should be accomplished during initial construction."**

FAA Airport Pavement Grooving Requirements, cont.

- **Paragraph 2-16 of FAA AC 150/5320-12C suggests considering the following for other runways:**
  - **History of aircraft hydroplaning,**
  - **annual rainfall rates and intensity,**
  - **surface abnormalities impeding runoff,**
  - **surface texture such as contaminant,**
  - **crosswind effects,**
  - **dropoffs at the end of the runway safety areas, etc.**

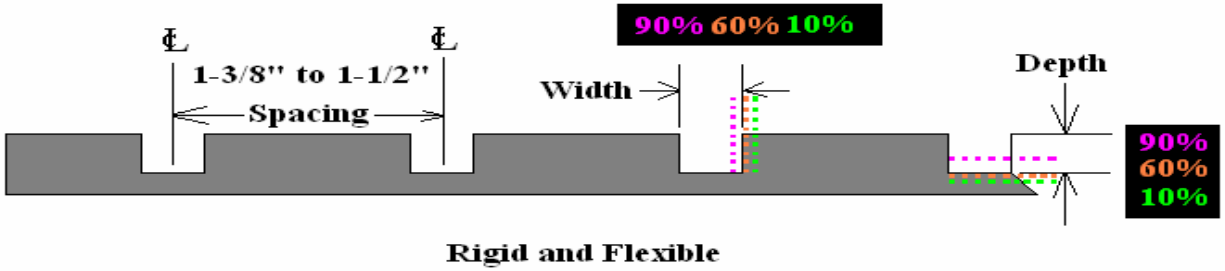
Previous FAA Groove Standards

Previous Groove Dimensions



Current FAA Groove Standards

Current Groove Dimensions



Rigid and Flexible

Field Measuring of Pavement Grooves

- **In September 2008, representatives from a US airport contacted the FAA to help resolve a dispute between the airport and a contractor constructing a runway. The dispute centered on whether the contractor saw-cut the grooves in rigid pavement according to the AC.**
- **The challenge to the FAA was to determine an appropriate method of measuring the constructed grooves for compliance with the AC.**

Field Measuring of Pavement Grooves

- **Furnish a grooving profiling procedure of the runway.**
- **This procedure would have to determine the necessary sample size to ensure a statistically significant confidence level.**
- **A 12,000 ft. runway can have approximately 95,000 grooves, this procedure had to accommodate a similar population.**

Groove Measurement Methods

- **Two methods were identified;**
- **a manual method measuring the depth, width, and separation of individual grooves using a depth gage and calipers and,**
- **a method using a laser displacement sensor affixed to a passenger vehicle.**
- **both methods were compared to each other on the same slab and in the same line.**

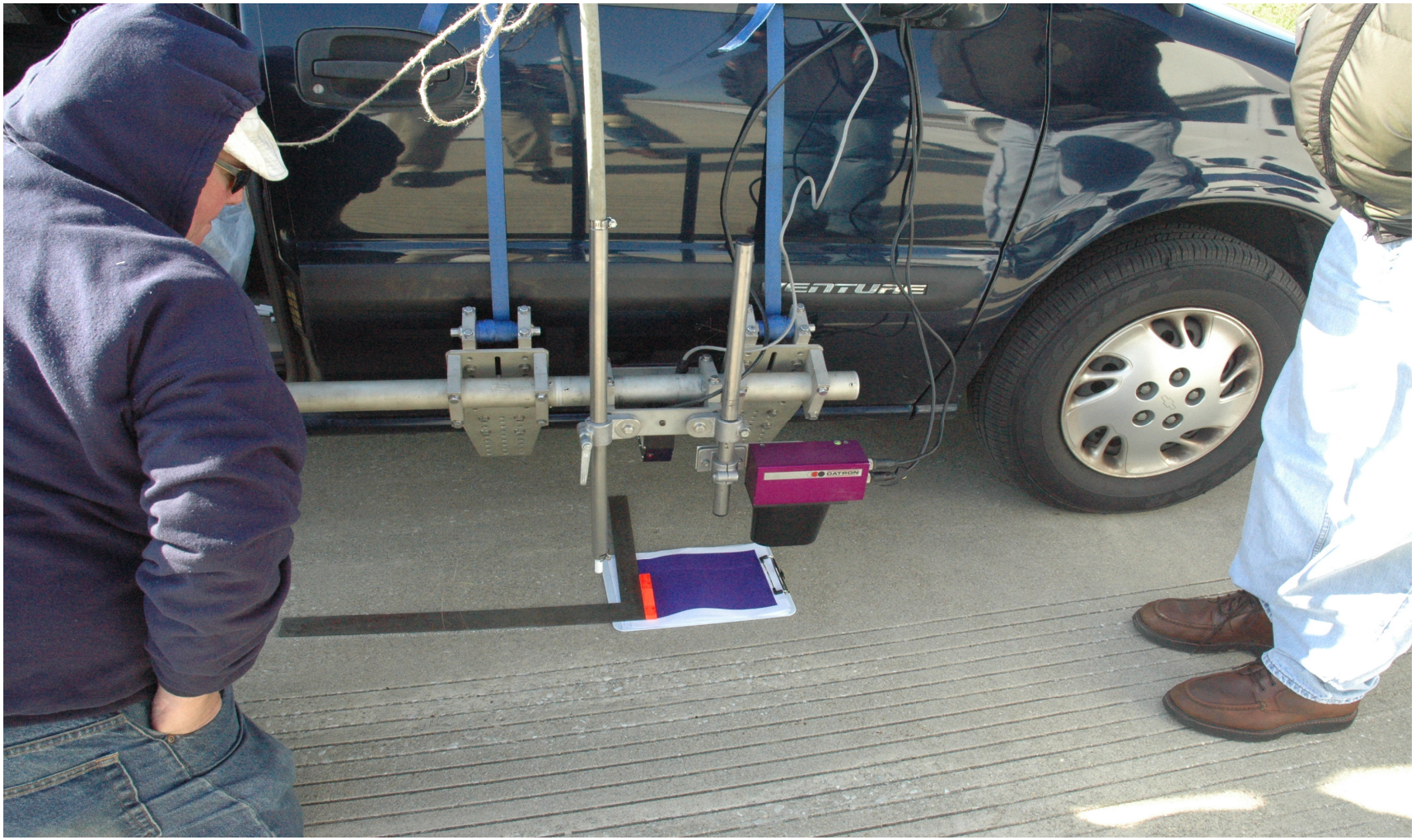
Manual Groove Measurement

Manual Groove Measurement Tools

Manual Depth Gage Measurements

Groove Measurement Worksheet								
		Distance				Depth by		Depth by
Groove		Between		Width		Gage		SELCOM
Number		(in.)		(in.)		(in.)		ProFAA
								(in.)
0								
1		1.306		0.159		0.1872		0.1638
2		1.321		0.17		0.1806		0.1615
3		1.314		0.186		0.1786		0.1649
4		1.322		0.177		0.1705		0.1706
5		1.322		0.175		0.1472		0.1367
6		1.314		0.185		0.1308		0.1163
7		1.306		0.187		0.1489		0.1468

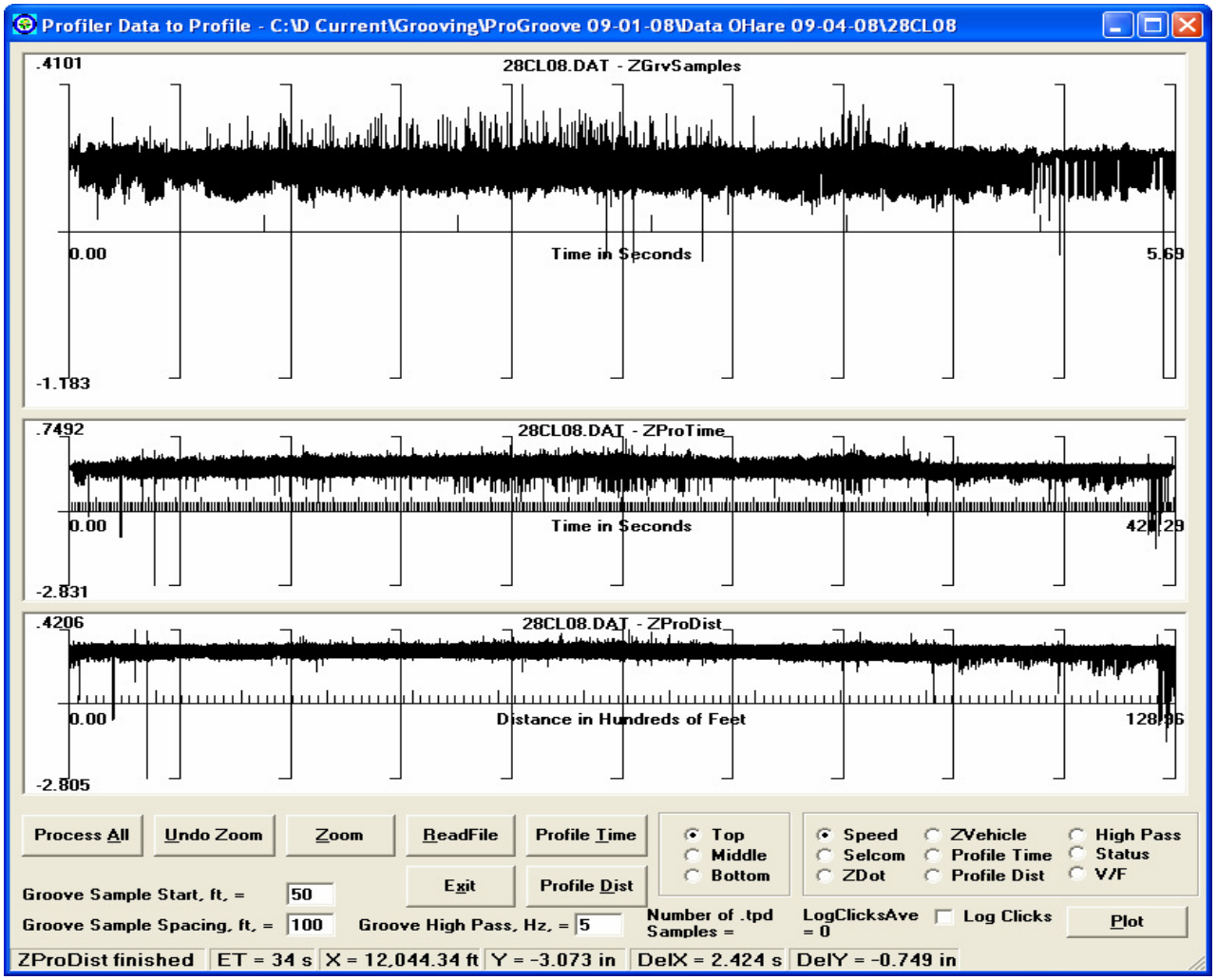
Laser Groove Measurement



Laser Displacement Sensor Specifications

- **Manufacturer/Model: LMI Selcom 2207-200/325**
- **Spot size: 0.04 in (1mm)**
- **Range: 8 in. (200mm)**
- **Resolution: 0.002 in (0.049mm) (12 bits)**
- **Primary sample rate: 32 kHz**
- **Storage sample rate: 8 kHz (11 samples/in at 40 mph)**
- **New system samples and stores at 64 kHz**

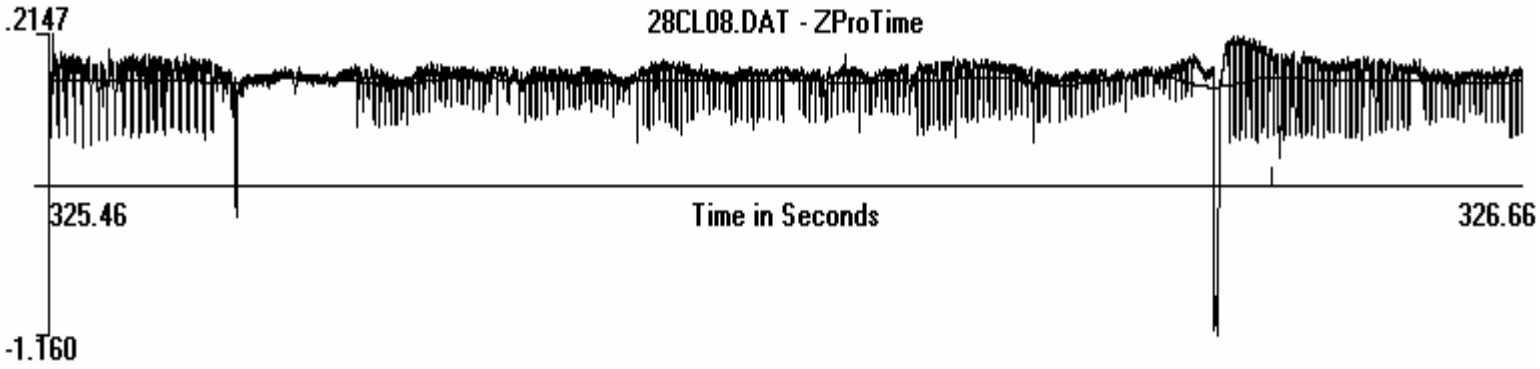
ProGroove Grooving Data



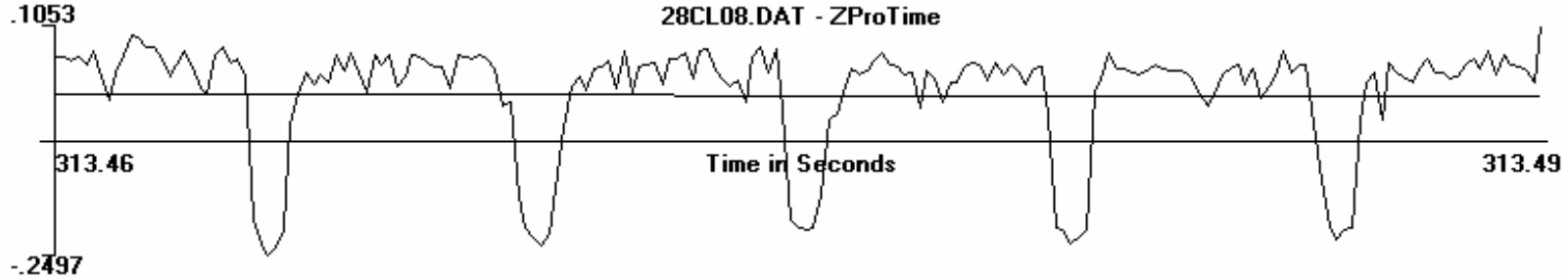
- A 13,000 ft runway has about 104,000 grooves.

Example Groove Plots

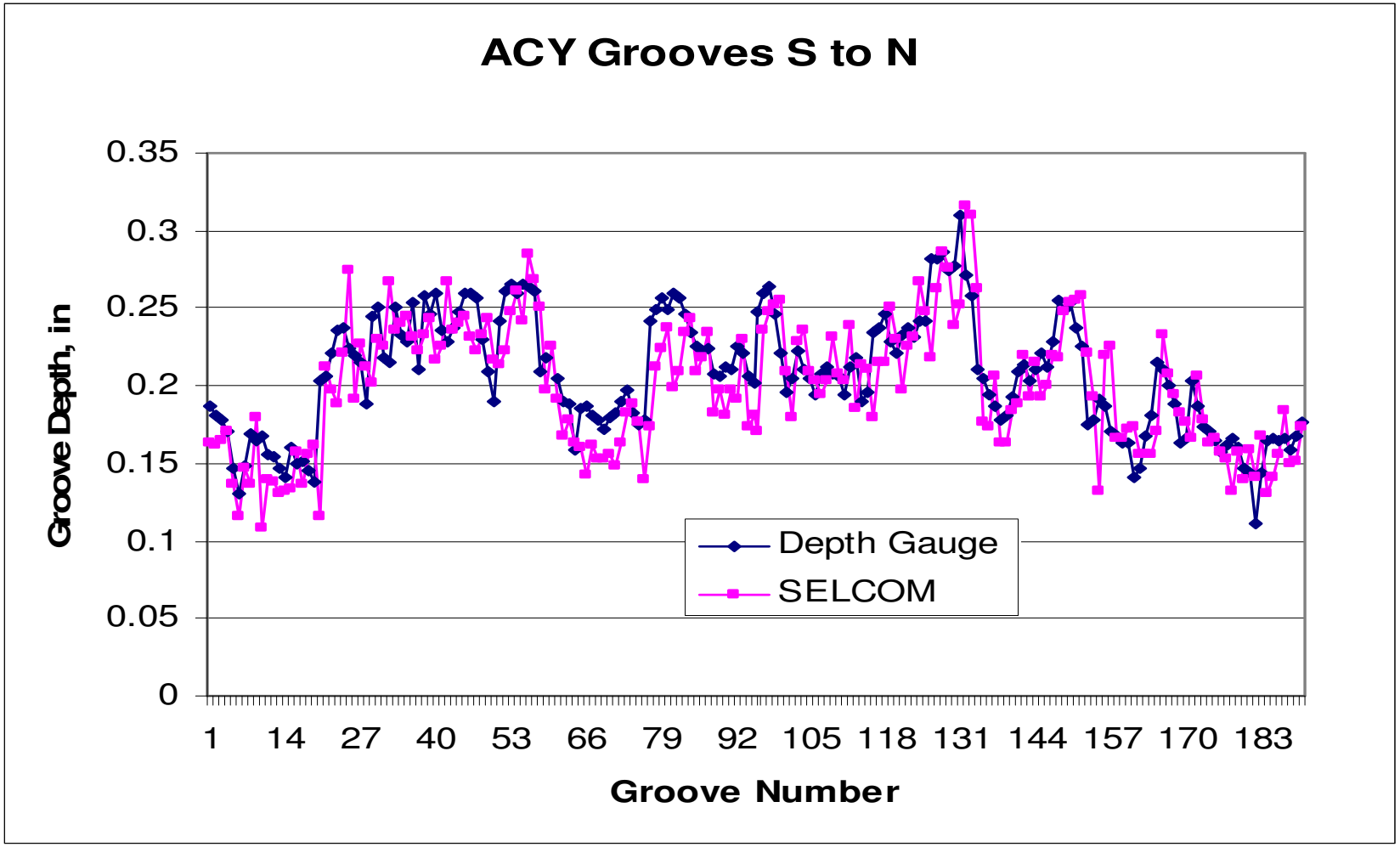
Example zoomed plot over about 35 feet.



•Close-up zoomed plot of standard grooves.



Comparison of ProGroove and Manual Groove Calculation at ACY – Runway 4



Current FAA Pavement Grooving Requirements

- **Instruments for measuring groove width and depth must have a range of at least 0.5 inches and a resolution of at least 0.005 inches. Gage blocks or gages machined to standard grooves width, depth, and spacing may be used.**
- **Instruments for measuring center-to-center spacing must have a range of at least 3.0 inches and a resolution of at least 0.02 inches.**

Current FAA Pavement Grooving Requirements

- **The Engineer will measure grooves in five zones across the pavement width. Measurements will be made at least THREE times during each day's production. Measurements in all zones will be made for each cutting head on each piece of grooving equipment used for each day's production.**

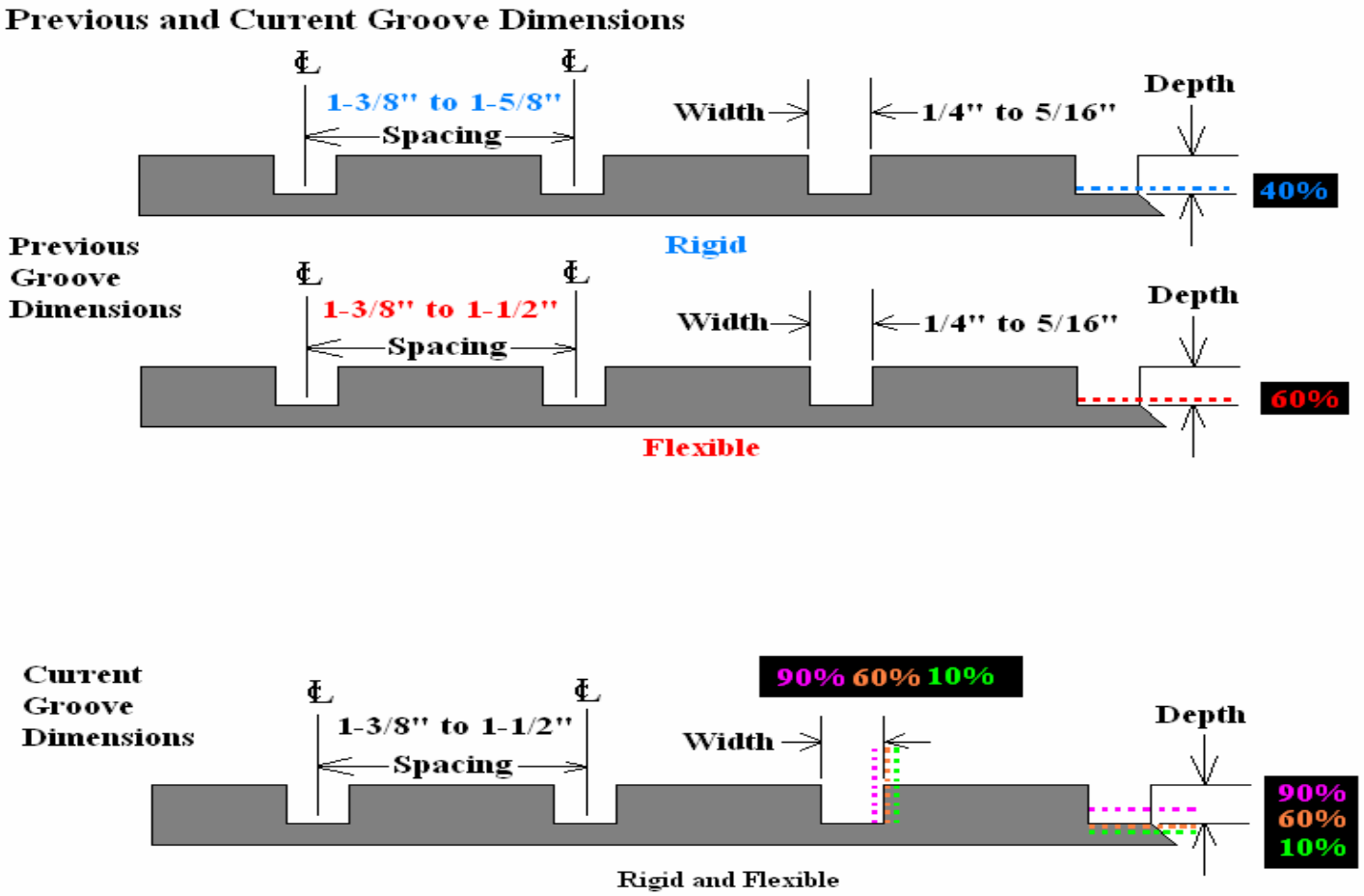
Current FAA Pavement Grooving Requirements

- **The five zones are as follows:**

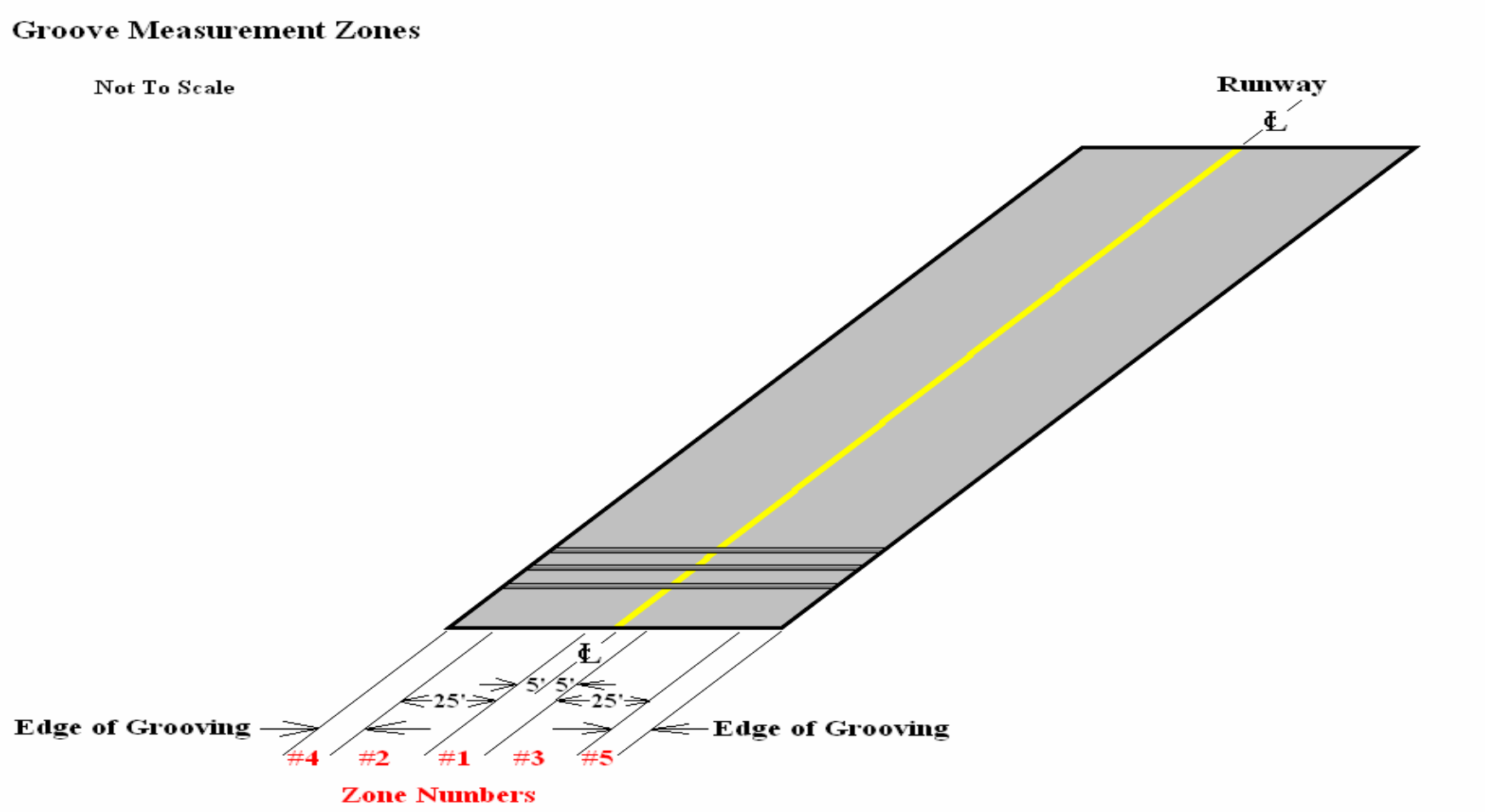
- **Zone 1** **Centerline to 5 feet left or right of the centerline.**
- **Zone 2** **5 feet to 25 feet left of the centerline.**
- **Zone 3** **5 feet 25 feet right of the centerline.**
- **Zone 4** **25 feet to edge of grooving left of the centerline.**
- **Zone 5** **25 feet to edge of grooving right of the centerline.**

- **Width or depth measurements less than 0.170 inches shall be considered less than 3/16 inches.**
- **Width or depth measurements more than 0.330 inches shall be considered more than 5/16 inches.**
- **Width or depth measurements more than 0.235 inches shall be considered more than 1/4 inches.**

Comparison of Previous and Current Groove Standards



Current Groove Measurement Methodology



Summary

- **The revision to FAA AC 150/5370-10E, Standards for Specifying Construction of Airports, dated 9/30/2009 clarifies the following grooving requirements:**

  - combined rigid and flexible in one section,

  - established criteria for acceptance testing equipment and the procedure for groove measurement in the field for acceptance,

  - augmented existing PWL acceptance standards for pavement grooving.

Acknowledgements

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